How Do You *KNOW* That?

Unraveling the Past Through Archaeology

AT A LECTURE, IN A CLASS OF FOURTH GRADERS, or in a committee room in the Vermont Statehouse, archaeologists talk with great excitement about the sites they discover. They enthuse about a 12,000-year-old camp site, or explain how Vermont's Native people were growing and eating beans, squash, and corn 1,100 years ago. Invariably, the interested public, students, and legislators ask, "How do you know that?" How do you know that place is a site? How do you know the site is 12,000 years old? How do you know what those ancient people ate? The Cloverleaf Site in Bennington richly illustrates how archaeologists use information recovered through the science of archaeology to unravel the past.

The Cloverleaf Site

Sifting Clues of the Past from an Ancient Village

ARCHAEOLOGISTS DISCOVERED THE 4,000-YEAR-OLD, Late Archaic camp in 1995 during pre-construction planning for the Bennington Bypass Project. Preliminary phases of archaeological study in 1995 and 1996 revealed a 1¾ acre site hidden within the floodplain of the Walloomsac River. The site was rich with important cultural information. Because portions of the site would be destroyed by the road-building project, the Federal Highway Administration, the Vermont Agency of Transportation, and the Vermont Division for Historic Preservation agreed that further investigations were necessary before the site was deeply buried beneath the new highway ramps.

Investigations in 1997 and 1998 uncovered evidence that 20–50 people camped in this place about 3,940 years ago for a few weeks, or perhaps a season, in the fall. Carefully excavating through the .5–1.5 meters (1.5–5 feet) of flood deposits, archaeologists discovered a site that had been sealed to the world for nearly 4,000 years. Archaeologists named this place the "Cloverleaf Site."

Archaeologists excavated only 6.5% of the total site area, recovering almost 130,000 stone artifacts as well as carbonized plant remains. They investigated many cultural deposits, such as a large roasting pit, garbage pits, fire hearths, stone-toolmaking workshops, and post-molds. About half of the 120 projectile points were made of gray, black, and green cherts from the Hudson River valley, but nearly all the stone waste flake was Vermont quartzite. Why?

This site diagram shows how the People organized their camp into separate activity areas.

The rich, organic, 4,000-year-old ground surface stands out, as does the dark storage pit on the right.

How do you KNOW...

...this is an archaeological site??

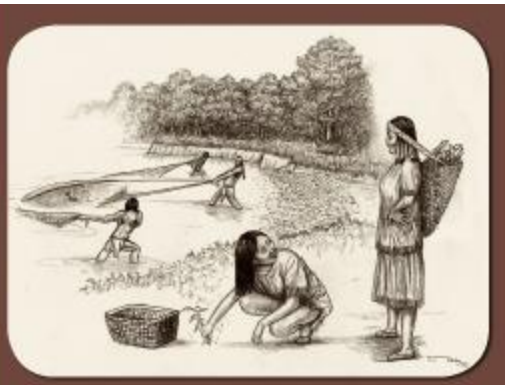
Location, location, location.

JUST LIKE TODAY, SOME PLACES ARE MORE LIKELY TO ATTRACT PEOPLE THAN others. As popular in ancient times as now, lands along rivers offered many benefits. The Walloomsac River served as a transportation route, connecting to the Hudson River, the Deerfield River, and Otter Creek. Its floodplains provided flat camping grounds; it was a source of food and water.

During planning for the western component of the Bennington Bypass Highway project, preliminary archaeological assessments determined that the area of the proposed cloverleaf exchange had a high potential for containing pre-Contact Native American archaeological sites. Three successive phases of archaeological study revealed a large, 4,000-year-old encampment loaded with exceptional cultural information: tools, fire hearths, roasting ovens, garbage pits, and many more clues to life along the Walloomsac long ago.

Soil layers speak to archaeologists, revealing stories of flooding, soil deposition, and ancient surfaces.

A cross-section into this ancient camp reveals black and red-stained fire hearths and other well-used areas of camp.



It was autumn. The band of 20–50 People had traveled a long way from the south and west, following the river valleys, heading to the quartzite sources in the quarries in the Green Mountains or below them in the riverbeds. The People decided that this was a good camping place: flat, near nut groves, and next to a resource-rich river. The river ensured a good supply of water during this hot and dry time period, and offered up fish, turtle, duck, and other food.

...this site is 4,000 years old?

THROUGH RADIOCARBON DATING

The many hearths at the Cloverleaf Site contained charcoal from burned wood and other plants. Scientists dated the charcoal using radiocarbon dating. Twenty charcoal samples yielded dates ranging between 4,110 and 3,819 years ago.

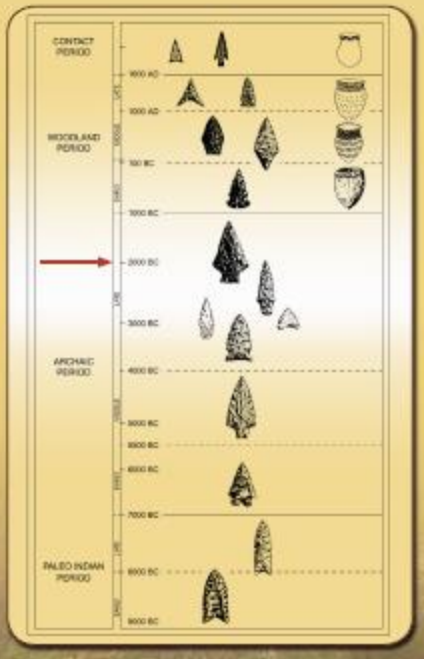
THROUGH ARTIFACT TYPES

Across the northeast, Normanskill projectile points are associated with sites dating from 4,300–3,800 years ago. The 115 Normanskill projectile points found at this site reinforce the date range found through the charcoal dating.

THROUGH STRATIGRAPHY

At the Cloverleaf Site, the top three layers of sediment ("strata") result from flood deposits when the Walloomsac River overflowed its banks. Archaeologists called the fourth layer at the site Stratum III. This layer of soils was formed during a period of floodplain stability. It contains the cultural artifacts and features, providing further evidence that these all date to the same time period.

Scientists prepare organic samples, like charcoal, for radiocarbon dating.
Courtesy of Beta Analytic



How do you KNOW...

...it's a tool?

PROJECTILE POINTS ARE PROBABLY THE BEST-KNOWN STONE tool. Projectiles were hafted to spear shafts for the first 10,000 years of Vermont history. Arrow points only came into use about 2,000 years ago. Making projectile points and other stone tools required experience and excellent craftsmanship. The People flaked large chunks of stone with a hammerstone into ever smaller and smaller forms. After a lot of thinning, the resulting preforms were shaped into projectile points or other implements. Flakes produced during tool making were often recycled as knives, scrapers, awls, and other uses.

Skilled tool-makers made "secondary preforms" as the semi-final shape before shaping the projectile points. Two complete lanceolate secondary preforms were recovered from this feature and radiocarbon dated to 3,910 ±70 Before Present. It may represent a cache left accidentally (or on purpose) at the site.

The People headed to the Green Mountains, and the riverbeds beneath them, in search of the fine, gray quartzite that was ideal for making projectiles for hunting spears. In their travel kit, they carried bundles of used projectiles to hunt with along the way. These were thrown out after new projectiles were made by the band's tool-making specialists. Pre-forms, shaped at the quarries or elsewhere offsite, were quickly thinned into projectiles, with thousands of flakes flying in an arc around the tool-maker. Band members used the sharp cutting edges of waste flakes to prepare food or scrape wood or hides. One band member broke a favorite atlatl weight while out hunting, and threw it away.

Two of the many Normanskill-type projectile points made of local Vermont quartzites.

River cobbles of varying sizes were used as hammerstones for shaping tools.

The People also made stone tools through laborious grinding. Adzes and celts such as these were probably used in woodworking. One of the People was probably unhappy to break his precious atlatl weight (right).

The People recycled and re-used materials. Suitably sized and shaped waste flakes such as these became expedient tools for a variety of cutting and scraping tasks. Archaeologists call these tools "utilized flakes."

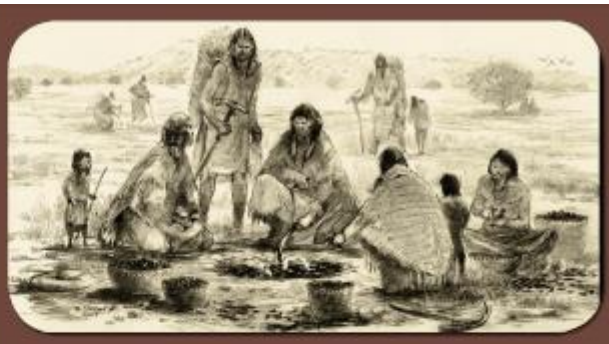
Objects are shown actual size

How do you KNOW...

Cultural features are rich windows into the People's lives.

THE CLOVERLEAF SITE CONTAINED MANY CULTURAL DEPOSITS: roasting pits, garbage pits, fire hearths, stone-toolmaking workshops, and post-molds. In contrast to artifacts, which you can put into a Ziplock bag, cultural deposits are non-portable and have to be excavated and documented in the field. Archaeologists call these cultural deposits "features." Features tell us a great deal about people's lives.

Features look different from the surrounding soils. They are often darker due to high organic content from plant and animal remains, or because the food stuffs and garbage were burned there. Features often contain other evidence of human activity, such as burned rock, tools, food, and materials from tool-making.



Carefully organizing camp, the band set up tents, identified work areas, and dug fire hearths and garbage pits for refuse. They dug a large pit, 3 by 4 meters (10 by 13 feet) for roasting nuts. A clean camp was important. Food waste was burned and then swept, along with stone-tool waste, ash, and other trash, into the garbage pits located around camp.

Courtesy of Eric Carlson

...it's a refuse pit?

IT'S ALL ABOUT GARBAGE AND getting rid of it—burying it, burning it. Refuse pits were large, deep pits full of sweepings from a house floor or workshop, or from cleaning out a hearth. They contained various densities of stone flakes, some stone tools, fire-cracked rock, and plant and animal remains.

Storage pits are generally smaller than refuse pits and they may have been lined with bark to store food. Storage pits were often reused for garbage after they no longer held stored food.

...is it a roasting pit, or a hearth?

THIS ROASTING PIT IS WIDER AND DEEPER THAN A HEARTH AND lined with large cobbles cracked by intense heat. The heat burned up the pit's plant and animal remains making species identification difficult, but it was probably used to roast nuts or tubers.

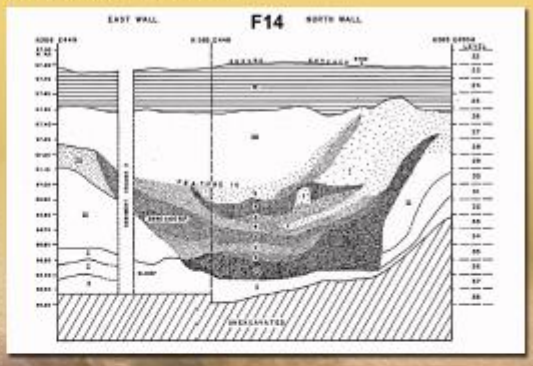
A hearth is a relatively shallow pit—sometimes it's just a big red stain—that contains burned sediments, charred plant and animal remains, and rocks cracked by intense heat. Twenty-one hearths were identified at the Cloverleaf Site.

Below, a roasting pit. Enlarged photo on bottom, a hearth.

...it's a post-mold?

POST-MOLDS ARE FILLED-IN POST holes. They can be big or little. Posts would have been used to support pots over a fire, to frame a shelter, a platform, or for drying racks. They appear as small, dark stains packed with rotten post wood and, at a later time, filled in with soils and refuse. The Cloverleaf Site post-molds contained post remains of cherry, beech, elm and hop hornbeam. They may have supported drying racks.

Archaeologists painstakingly document features since excavation destroys them. What's left? Only field records and lab analyses of their contents.



How do you *KNOW*...

...what people ate?

BACK AT THE ARCHAEOLOGY LAB, PAINSTAKING ANALYSIS of feature contents identified burned pieces of butternut and hazelnut in particular, but also beechnut, acorn, and hickory nuts. Seed analysis distinguished fleshy fruits, such as grapes and pin cherries, bedstraw, smartweed, hog peanut, and tubers. These tiny meal "leftovers" serve as clues to people's diet and the time of year when the site was occupied. The only animal bones found at Cloverleaf are very small, burned fragments, making them difficult to identify. All bones that could be identified to class are mammal or turtle bones.

Butternut

FOODS	DYESTUFFS	MEDICINAL USE
Butternut	Butternut	Butternut
Black Walnut	Black Walnut	Black Walnut
Hickory	Oak	Hickory
Oak	Hazelnut	Oak
Hazelnut	Staghorn Sumac	Hazelnut
Pigweed	Bedstraw	Fire Cherry
Fire Cherry		Hog Peanut
Hog Peanut		Snowberry
Buckwheat		Buckwheat
		Bedstraw

Hazelnut

Summer had ended and fall was coming on. The People used any available deadwood for their hearths and roasting ovens. They dug a large pit for roasting the many nuts they harvested. While some family members minded the roasting process, others gathered food, like hawthorn, pin cherries, grapes, and various tubers, such as hog peanut, and other plants for medicine and bedding.

...which season people lived at this site?

PLANT REMAINS PROVIDE CLUES TO THE TIME OF YEAR THAT the site was occupied. Nuts, grapes, and pin cherries all ripen in the late summer and fall.

Sieving huge volumes of feature contents through a water flotation process separates the useful plant remains from their charcoal and soil capsule.

Microscopes are essential laboratory tools for identifying plant and animal remains.

...what the environment was like?

CHARCOAL ANALYSIS CATALOGED A FULL COMPLEMENT OF tree species at the site 4,000 years ago, telling us about the local environmental conditions. Wood remains from the Cloverleaf Site indicate that the local conditions 4,000 years ago consisted of mixed upland forest, including beech, sugar maple, birch, and white pine trees, and floodplain forest, including elm, ash, butternut, sycamore and alder trees. These forests were probably closed, since open forest species, such as hickory and oak, are uncommon. However, fire episodes or other types of human or natural disturbances may have been frequent; quickly colonizing species such as hawthorn, cherry, and poplar were cataloged during analysis.

Fire hearths such as this contain plant remains and wood charcoal, the critical clues to answering questions about diet, time of year, and local environments.

Putting it all together

KNOWLEDGE THAT FLOODPLAINS CAN hide important sites, a good sampling strategy, and careful methodology led to the Cloverleaf Site's discovery. Months of excavations over four years and another decade of painstaking data analysis unraveled the clues about a band of Native People who lived in this place for a few weeks, or a whole season, 4,000 years ago. The 355-page final excavation report illustrates in incredible detail how archaeologists tease knowledge out of data. This exhibit offers a glimpse into the report and the science and process of archaeology. The Cloverleaf Site is one of the most significant, richest sites of this time period in the greater Northeast. Decades from now, the site's data collections, stored permanently here at the Vermont Archaeology Heritage Center, will continue to offer opportunities to learn more about Vermont's Native People and the environment in which they lived and died 4,000 years ago.

21st-century people now travel on the newly-built Bennington Bypass highway across this 4,000-year-old village.

What DON'T we know about the Cloverleaf Site People after so much study?

WHEN STUDYING THE DISTANT PAST, THERE ARE ALWAYS many more questions than answers. Why did the People leave behind such a large number of seemingly still useful chert projectile points at the site? Did they make so many new quartzite points that the old ones were just expendable? Or, did tradition or ritual require an "exchange" of old projectiles when new ones got made? And exactly where did they procure the quartzite stone, which we think was the object of their Vermont journey? Archaeologists found neither fish bones nor any fishing tools. Does this mean the People didn't fish at this camp? What did their shelters look like? How much hunting did they do during their stay along the river? In the future, scientific techniques not yet invented may provide some answers from within the irreplaceable collections now housed at the Vermont Archaeology Heritage Center.

Archaeology is a fun and interactive way to teach history and environmental science.

The Bennington Bypass archaeological collections, and many others, are now curated and available for future research at the new Center.